



LABORATORY
OF THE
INLAND REVENUE DEPARTMENT
OTTAWA, CANADA

BULLETIN No 297

Effervescent Citrate of Magnesia



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J. U. VINCENT, Esq.,
Deputy Minister of Inland Revenue.

OTTAWA, November 10, 1914.

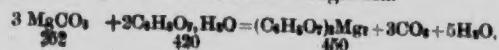
SIR.—I have the honour to hand you a report upon fifty-two (52) samples purchased by our inspectors in Montreal and Toronto as Effervescent Citrate of Magnesia. Complaints have reached the department from time to time regarding this preparation, charging that it is not true to name. The results herein reported appear to justify complaint, since none of them contain Citrate of Magnesia, nor is Citrate of Magnesia present after their solution in water. The only salt of magnesia present is the sulphate (Epsom Salt) and the only citrate is the sodium salt. Tartrate of Soda is usually quite as much in evidence as the citrate, and sugar is invariably present to amounts varying from 25 to 50 per cent.

The article, as found on the market is a very pleasant cooling drink, having slightly aperient properties. No fault can be found with it on the ground of harmfulness to health. On the contrary there can be no doubt of its wholesomeness and desirability especially as a summer drink.

It is unfortunate that the name under which it is offered for sale should be so grossly misleading; a good explanation is doubtless to be found in the fact that Citrate of Magnesia as *Magnesia Citrate's Liquor or Solution of Magnesium Citrate* has long enjoyed repute as a pleasant and mild aperient. Among the unofficial preparations named in Squire's Companion to the British Pharmacopoeia it is directed to be prepared by dissolving 100 grains of Magnesium Carbonate in a solution of 200 grains of Citric Acid. This leaves 33 grains of Citric Acid in the free state (see footnote), and 178 grains of Citrate of Magnesia in solution. A small amount of a flavouring solution (syrup of lemons) is added, and the whole diluted to 1 pint. Then 40 grains of potassium bi-carbonate is added, causing effervescence, and neutralizing 28 grains of the free citric acid, thus leaving about 5 grains of the free acid to give a pleasant acidity to the drink.

Unless this drink is prepared for immediate use it must be kept in a strong bottle, like those in use for ginger ale or soda water, making it an expensive article, difficult of transportation and unsuitable for preparation in the home.

The magnesium carbonate of the pharmacopoeia is of somewhat uncertain composition. The normal carbonate contains 47.6 per cent of magnesia. Official magnesium carbonate is required to contain at least 40 per cent of magnesia (the Oxide). If we assume this minimum value, 66.6 parts of such carbonate and 93 parts of citric acid are required to produce 100 parts of Citrate of Magnesia.



Carbonate of magnesia is, however, unsuited to the convenient preparation of the citrate on account of its insolubility in water. It follows that, if the laxative citrate of magnesia is required to be present, it must be added as such.

Effervescent Citrate of Magnesia is not mentioned in the British Pharmacopoeia. Effervescent Magnesium sulphate (*Magnesii Sulphas Effervescens*) or Effervescent Epsom salt, is defined, and consists of Magnesium Sulphate, Sodium bi-carbonate, Tartaric acid and Citric acid and Sugar.

Instructions are to heat (50 ounces) crystallized sulphate of magnesia to loss of 23 per cent weight (by which treatment 50 ounces of the crystallized salt containing 48.8 per cent of anhydrous magnesium sulphate and 51.2 per cent water, becomes 38.5 ounces of a partially dehydrated salt containing 63.4 per cent of anhydrous magnesium sulphate and 36.6 per cent water); to mix this with 36 ounces of Sodium bi-carbonate, 19 ounces of Tartaric acid, 12½ ounces of Citric acid, and 10½ ounces of sugar. The combination of these articles, weighing 116.5 ounces, is directed to be dried to a weight of about 100 ounces. This treatment, causing a further loss of weight of about 16.5 ounces, results in a product which contains the whole of the magnesium sulphate originally present, together with a somewhat indefinite amount of the Citrate and Tartrate of Soda, produced by the interaction of the free citric and tartaric acids, with the bi-carbonate of soda during the final heating; and a more or less varying quantity of water, this largely depending upon the manner in which the final heating has been conducted. If we assume that the loss of weight in the final heating is chiefly due to loss of water (an assumption which can only be approximately realized, when even the greatest care in manufacture is taken) the final product would have the following composition:—

	Per cent.
Magnesium Sulphate ($MgSO_4$)	24.4
Sodium bi-carbonate ($NaHCO_3$)	33.6
Tartaric acid ($C_4H_6O_6$)	19.0
Citric Acid ($C_6H_8O_7$, H_2O)	12.5
Sugar	10.5

In this calculation I have assumed total dehydration of the Sulphate of Magnesia and the loss of a certain amount (2.4 oz.) of carbonic acid from the bi-carbonate of soda. The calculated result can only be taken as an approximation to the facts, since the formation of more or less citrate and tartrate of soda by double decomposition is inevitable. It is, however, sufficiently close to indicate that the commercial article offered as Effervescent Citrate of Magnesia is not to be confounded with the Effervescent Sulphate of Magnesia of the British Pharmacopoeia, which contains approximately 25 per cent of Magnesium Sulphate while the amount of this salt found in the article herein reported varies from less than 1 to about 6 per cent.

It would naturally be expected that an effervescent citrate of magnesia should be analogous in character to the pharmacopoeial effervescent sulphate, substituting only the citrate for the sulphate. In such case, the predominant component should be magnesia in such a form that, when used, this magnesia would be present as citrate.

The United States National Dispensatory of Stille, Maisch and Caspari (I quote from the 5th Edition, 1894) contains the following formula for Effervescent Magnesium Citrate:—

Magnesium Carbonate	10 guns.
Citric Acid	46 "
Sodium bi-carbonate	34 "
Sugar	8 "

The German and French Pharmacopeias are quoted as giving the same formula, a statement which I have not been able to verify. The U. S. Dispensatory of Wood and Bache (17th Edition, 1895) contains the same formula. In this formula 16.7 grammes of citric acid are required for conversion of the magnesium carbonate into citrate,

yielding 17.9 grammes of Magnesium Citrate; 28.3 grammes of citric acid are required to convert the bi-carbonate of soda (34 grammes) into citrate of soda (34.8 grammes), leaving one gramme excess of citric acid in the free state in each 98 grammes of original material. These numbers may, for practical purposes be taken as percentages; and the formula is a good one, resulting in a pleasant effervescent beverage when used as directed.

In the absence of any other recognized formula for Effervescent Citrate of Magnesia, I am disposed to interpret the results of analysis herein recorded by reference to this one.

Determinations of sugar, tartaric acid, citric acid, sulphate of magnesia and bi-carbonate of soda have been made. It is evident that neither tartaric acid nor sulphate of magnesia are called for, nor should they be present in an article which is offered under a name which gives no indication of their presence, but on the contrary, purports to contain only citrate of magnesia; or, if we accept the above formula as authoritative, citrates of magnesia and soda. Approximately, the results of analysis should show citric acid about 45 per cent; bi-carbonate of soda, about 35 per cent, and sugar about 8 per cent.

More or less spontaneous change must occur in a mixture of the kind, and the change will be influenced by the dryness of the original preparation, the care with which it is protected from atmospheric moisture and the length of time since preparation. The analytical numbers quoted in the table represent the article as received by us and must not be taken to indicate exactly the quantities used in manufacture. Generally speaking, it is to be noted that in all the samples, a much higher percentage of sugar is present than the above quoted formula requires. Magnesium sulphate in amount from 1 to 6 per cent is present in all but 8 samples. Tartaric acid is present in all but 3 samples.

The result of this examination is to show that the commercial article sold as Citrate of Magnesia contains no citrate of magnesia. It is, therefore, not true to name and the name under which it is offered is entirely misleading. Its aperient properties are (in nearly all cases) due to the presence of Epsom Salt, and to the sodium salts of citric and tartaric acids.

It is extremely variable in character, sugar forming a principal ingredient. While about 8 per cent sugar is indicated for the Effervescent Citrate of Magnesia of the U. S. National Dispensatory, and about 10 per cent. for the Effervescent Sulphate of Magnesia of the British Pharmacopoeia, I find about 20 per cent to above 50 per cent in the samples now reported.

I find no intentional fraud indicated by these results; and the history of the article, so far as I have been able to follow it, shows a gradual effort to modify the original effervescent citrate so as to produce an article which should be more practicable and should meet the taste of the public while retaining, as far as possible, the refrigerant and aperient properties of the prototype. The name has meantime been retained, but without any purpose of deception; rather, perhaps, for lack of a convenient substitute.

Now that the commercial article has assumed a form in which no citrate of magnesia is present, it must be evident that a change of name is in order. Some manufacturers recognizing this, have suggested that the name *Granular Effervescent Salts* might be adopted. Whether by the use of a non-committal term, like the above, or by the use of a truly descriptive name, such as *Effervescent Citro-Tartrate of Soda, with Epsom Salt and Sugar*, it is apparent that something must be done to prevent the misuse of the name citrate of magnesia, at present employed.

The report now submitted will serve to advise the public regarding the true character of the article, as now offered; and the question of a new name for what is widely in demand, and apparently approved by the public, will engage the attention of your Advisory Board.

I beg to recommend publication of this report as Bulletin No. 297.

I have the honour to be, Sir,

Your obedient servant,

A. MCGILL,
Chief Analyst.

70157-2

To Committee by Parke Davis & Co. L. 2. 660

Date of Collection.	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Cost.	Name and Address of Manufacturer or Furnisher, as given by the Vendor.	
					Quantity.	Cents.	Manufacturer.	Furnisher.

DISTRICT OF MONTREAL—

1914.

Mar. 10	Effervescent Citrate of Magnesia.	62451	J. A. Asselin, 386 Centre St., Montreal.	½ lb.	20	.....	McEwn, Cameron & Wait, Ltd.
" 10	"	62452	E. Ethier, 461 Centre St., Montreal.	½ "	30	.....	Lyman's, Ltd...
" 10	"	62453	Armon's Pharmacy, 2710 Notre Dame St., West, Montreal.	½ "	30	.....	McEwn, Cameron & Wait, Ltd.
" 10	"	62454	E. Ethier, 2276 Notre Dame St., West, Montreal.	½ "	30	.....	Lyman's Ltd...
" 10	"	62455	Dr. Letourneau, 2097 Notre Dame St., West, Montreal.	½ "	30	.....	Nat. Drug Co...
" 10	"	62456	Canadian Drug Store, 3bots. 1787 Notre Dame St., West, Montreal.	75	Fray, Wyeth, Homer, Ltd.	.....
" 10	"	62457	J. H. D'Aigle, 1627 Notre Dame St., West, Montreal.	½ lb.	25	.....	Lyman's, Ltd...
" 11	"	62458	J. O. Mathieu, 1393 Notre Dame St., West, Montreal.	½ "	30	.....	Nat. Drug Co...
" 11	"	62459	G. M. Lalonde, 1320 Notre Dame St., West, Montreal.	½ "	30	.....	Lyman's, Ltd...
" 11	"	62460	R. Raizenne, 701 Notre Dame St., West, Montreal.	½ "	30	Toronto Pharmacal Co.	.....
" 11	"	62461	Metale's Pharmacy, 545 Notre Dame St., West, Montreal.	½ "	25	Unknown	.....
" 12	"	62462	J. Pigeon, 412 Notre Dame St., West, Montreal.	½ "	35	.....	Lyman's, Ltd...
" 12	"	62463	Birks' Pharmacy, 340 Notre Dame St., West, Montreal.	½ "	25	.....	.....
" 12	"	62464	H. E. Archambault, 78 Notre Dame St., West, Montreal.	½ "	25	Toronto Pharmacal Co.	.....
" 12	"	62465	A. Le Beau, 465 St. James St., West, Montreal.	½ "	25	.....	Lyman's, Ltd...
" 12	"	62466	J. E. H. Quipp, 95 Windsor St., Montreal.	½ "	30	.....	.....
" 12	"	62467	Lyons Cut Rate Drug Store, Catherine and St. Lawrence Sts., Montreal.	1 bot.	65	.....	.....
" 14	"	62468	Pharmacie Robert, ½ lb. Craig and St. Lawrence Sts., Montreal.	½ lb.	30	Nat. Drug and Chem. Co.	.....
" 14	"	62469	J. H. Nault, 42 St. Catherine St., East, Montreal.	½ "	25	Unknown	.....
" 14	"	62470	Albert's Drug Store, 271 St. Lawrence St., Montreal.	½ "	35	.....	.....

EFFERVESCENT CITRATE OF MAGNESIA.

Inspector's Report. (Is not an expression of opinion.)	Results of Analysis.					No. of Sample.	Remarks and Opinion of the Chief Analyst.
	Cane Sugar.	Tartaric Acid.	Citric Acid.	Sulphate of Magnesia.	Bicarbonate of Soda.		

D. J. KEARNEY, INSPECTOR.

	p.e.	p.e.	p.e.	p.e.	p.e.		
.....	44·6	14·6	12·2	5·6	27·7	62451	Contains no Citrate of Magnesia.
.....	51·0	8·2	13·9	4·5	27·7	62452	" "
.....	41·8	14·8	12·3	5·8	27·8	62453	" "
.....	49·8	8·3	13·4	4·2	27	62454	" "
.....	33·0	18·6	14·8	2·2	40·3	62455	" "
.....	20·2	16·3	24·9	1·1	45·2	62456	" "
.....	58·0	None.	19·7	3·5	20·6	62457	" "
.....	31·2	17·9	15·0	1·5	40·6	62458	" "
.....	50·0	10·5	10·2	5·1	26·1	62459	" "
.....	21·0	23·2	17·6	None.	44·8	62460	" "
.....	32·0	18·8	15·8	2·7	40·8	62461	" "
.....	47·5	7·0	13·7	4·5	26·3	62462	" "
.....	22·6	17·2	26·5	1·05	43·0	62463	" "
.....	23·8	22·3	18·5	None.	45·1	62464	" "
.....	47·3	8·1	12·6	4·3	26·3	62465	" "
.....	22·5	16·2	27·1	1·05	46·2	62466	" "
.....	41·1	16·7	11·5	6·0	28·1	62467	" "
.....	32·8	18·2	16·0	2·4	40·4	62468	" "
.....	54·0	None.	18·8	3·5	20·2	62469	" "
.....	58·4	"	20·0	3·5	20·7	62470	" "

BULLETIN No. 297—

Date of Collection.	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer Furnisher as given by the Vendor.	
				Quantity.	Cents.	Manufacturer.	Furnisher.

DISTRICT OF TORONTO—

1914.							
Mar. 20	Effervescent Citrate of Magnesia.	62127	E. G. West & Co., 80 $\frac{1}{2}$ lb. George St., Toronto	13	Vendors.....		
" 20	"	62128	The Lyman Bros. Co., $\frac{1}{2}$ "	25	"		
" 20	"	62129	The Robert Simpson 3 bots.	45		Shorland & Co., Montreal.	
" 23	"	62130	The Shuttleworth Chem. Co., Ltd., Wilton and Victoria Sts., Toronto.	20	Vendors.....		
" 23	"	62131	J. F. Taylor Pharmacal Co., Ltd., 81 William St., Toronto.	20	"		
" 23	"	62132	The Moyes Chem. Co., $\frac{1}{2}$ "	15	"		
" 23	"	62133	Toronto Pharmacal Co., Ltd., 455 King St. West, Toronto.	40	"		
" 24	"	62134	The Nat. Drug and Chem. Co., Ltd., Toronto.	15	"		
" 24	"	62135	Liggett's, Ltd., 106 3 bots.	57	H. K. Wampole & Yonge St., Toronto.		
" 24	"	62136	The T. Eaton Co., Ltd., 3 bots.	45	Vendors.....		
" 24	"	62137	Tamblyns, Ltd., 1674 $\frac{1}{2}$ lb. Dundas St., West, Tor- onto.	20	E. G. West & Co., Toronto.		
" 24	"	62138	Fred Coward, 402 Spa- dina Ave., Toronto.	30			
May 6	"	62139	H. A. Spotswood, 412 $\frac{1}{2}$ lb. College St., Toronto.	25	The Moyes Chem. Co., Ltd., Toronto.		
" 6	"	62140	J. W. Struthers Sons, $\frac{1}{2}$ "	20	The E. B. Shuttle- worth Chem. Co., Ltd., Toronto.		
" 6	"	62141	F. S. Taylor, 292 Spa- dina Ave., Toronto.	25	The Nat. Drug and Chem. Co., Ltd., Toronto.		
" 7	"	62142	Williams Pharmacy, 684 $\frac{1}{2}$ "	20	E. G. West & Co..		
" 7	"	62143	J. W. Lawrence, 996 $\frac{1}{2}$ "	25	The E. B. Shuttle- worth Chem. Co., Ltd., Toronto.		
" 7	"	62144	E. J. Doak, 1470 Queen $\frac{1}{2}$ "	25	The Toronto Phar- macal Co., Ltd., Toronto.		
" 7	"	62145	G. C. McFarlane, 505 $\frac{1}{2}$ "	25	The Lyman Bros. & Co., Toronto.		
" 7	"	62175	G. W. Ferrier, 233 Col- lege St., Toronto.	25	H. K. Wampole & Co., Ltd., Perth, Ont.		

EFFERVESCENT CITRATE OF MAGNESIA.

Inspector's Report. (Is not an expression of opinion.)	Results of Analysis.						Remarks and Opinion of the Chief Analyst.
	Cane Sugar.	Tartaric Acid.	Citric Acid.	Sulphate of Magnesia.	Bicarbonate of Soda.	No. of Sample.	
H. J. DAGER, INSPECTOR.							
	p.e.	p.e.	p.e.	p.e.	p.e.		
Wests	26·8	14·9	20·3	4·7	42·4	62127	Contains no Citrate of Magnesia.
.....	23·0	22·2	24·4	None.	49·3	62128	" "
.....	41·3	14·8	12·0	6·1	26·3	62129	" "
.....	34·5	14·5	16·1	5·4	30·5	62130	" "
Brown colour due to being overdried.	34·6	18·8	17·5	None.	43·8	62131	" "
.....	23·3	10·6	22·0	2·1	52·0	62132	" "
.....	23·1	21·3	18·6	None.	45·6	62133	" "
.....	33·6	18·6	15·6	2·5	40·6	62134	" "
.....	22·6	18·9	11·5	4·0	40·3	62135	Contains Phosphates. Contains no Citrate of Magnesia.
Reg. No. 94. The P. or P. M. Act.	31·0	19·6	12·5	6·1	32·1	62136	Contains no Citrate of Magnesia.
Reg. No. 130. The P. or P. M. Act.	28·6	15·3	17·0	5·0	39·8	62137	" "
"Standard" Brand. Im- ported and Packaged by Vendor.	26·7	12·0	11·5	5·2	31·9	62138	" "
.....	27·2	13·0	21·9	1·9	59·6	62139	" "
.....	37·6	14·2	16·0	5·4	31·6	62140	" "
.....	45·9	15·1	10·9	5·3	36·8	62141	" "
.....	32·5	17·1	18·0	5·6	42·0	62142	" "
.....	41·8	15·9	16·9	5·7	35·0	62143	" "
.....	27·6	22·2	18·6	None.	50·0	62144	Contains no Citrate of Magnesia.
.....	28·3	21·9	20·4	"	47·0	62146	" "
.....	25·7	23·8	10·9	5·9	42·0	62175	Contains Phosphates. Contains no Citrate of Magnesia.

BULLETIN No. 297—

Date of Collection.	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Cost.	Name and Address of Manufacturer or Furnisher, as given by the Vendor.						
					Quantity.	Cents.	Manufacturer.				
DISTRICT OF HAMILTON											
1914.											
April 16	Effervescent Citrate of Magnesia.	63221	G. F. McDowell, 212½ Colborne St., Brantford.	lb. 25	Nat. Drug and Chem. Co., Ltd., Hamilton.						
" 16	"	63222	C. A. C. Cameron, 191½ Colborne St., Brantford.	" 20	The Lyman Bros. Co., Ltd., Toronto.						
" 16	"	63223	Higginbotham & Cameron, 373 Colborne St., Brantford.	" 20	The E. B. Shuttleworth Chem. Co., Ltd., Toronto.						
" 21	"	63224	J. H. Smith, Dunnville	" 30	The Nat. Drug and Chem. Co., Ltd., of Canada.						
" 23	"	63225	W. G. Smith, Welland	" 25	The E. B. Shuttleworth Chem. Co., Toronto.						
" 24	"	63226	J. N. Walker, St. Catharines.	" 25	The Nat. Drug and Drag Co., Ltd., of Canada.						
" 24	"	63227	F. W. Jeffs, St. Catharines.	" 20	The Moyes Chem. Co., Ltd., Toronto.						
" 29	"	63228	J. S. McArtney, Niagara Falls, Ont.	" 25	The Nat. Drug and Chem. Co., Ltd., Hamilton.						
May 1	"	63229	W. A. Howell, Hamilton	" 20	Unknown ...						
" 1	"	63230	Sweet & Dunlop, Hamilton.	" 25	Toronto Pharmacal Co., Ltd., Toronto.						
" 1	"	63231	W. B. Smith, Hamilton	" 25	E. G. West & Co., Toronto.						
" 1	"	63232	Hennessey Drug Stores, Hamilton.	" 20	The Moyes Chem. Co., Ltd., Toronto.						

EFFERVESCENT CITRATE OF MAGNESIA.

Inspector's Report. (Is not an expression of opinion.)	Results of Analysis.					Remarks and Opinion of the Chief Analyst.
	Cane Sugar.	Tartaric Acid.	Citric Acid.	Sulphate of Magnesia.	Bicarbonate of Soda.	
H. J. DAGER, ACTING INSPECTOR.						
	p.e.	p.e.	p.e.	p.e.	p. e.	
.....	29·0	19·6	15·3	2·8	41·7	63221 Contains no Citrate of Magnesia.
.....	28·2	19·6	15·7	2·8	42·5	63222
.....	31·8	14·5	19·3	5·1	35·5	63223
.....	33·1	20·2	14·2	2·8	41·0	63224
.....	30·7	15·0	19·0	5·0	34·0	63225
.....	39·0	19·8	15·8	2·9	41·5	63226
.....	24·3	13·8	21·1	2·0	56·4	63227
.....	38·3	20·0	15·5	2·7	42·0	63228
.....	45·7	14·9	11·3	5·1	36·8	63229
.....	27·3	22·5	20·0	None.	50·0	63230
.....	31·3	16·7	18·6	3·7	42·3	63231
.....	36·2	19·7	14·9	2·3	41·7	63232